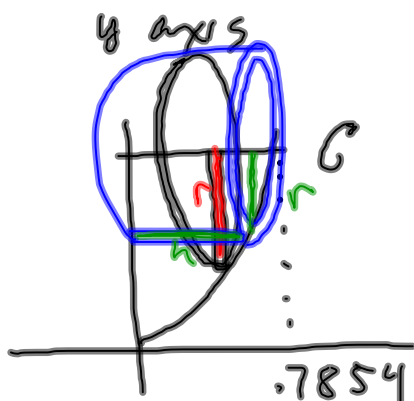


21.

$$y = \sqrt{2}$$

$$y = \sec x \tan x \quad \text{about} \quad y = \sqrt{2}$$



$$r = \sqrt{2} - \sec x \tan x$$

$$\int_0^{0.7854} \pi (\sqrt{2} - \sec(x) \tan(x))^2 dx$$

$$\int 2\pi r h dy \quad r = \sqrt{2} - \sec x \tan x$$

$$h = x$$

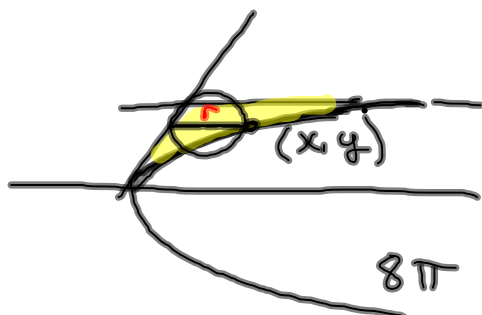
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41.

$$y=0 \quad y=2$$

circular disks

$$x = \sqrt{5} y^2$$



$$\int_0^2 \pi r^2 dy$$

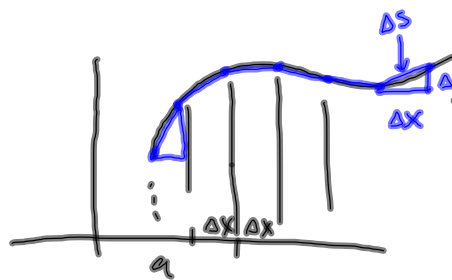
need r in terms of y

$$d = 2r = x \quad r = \frac{x}{2}$$

$$8\pi = \int_0^2 \pi \left( \frac{\sqrt{5}y^2}{2} \right)^2 dy \quad r = \frac{\sqrt{5}y^2}{2}$$

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7.4 arc lengths



$$\Delta s^2 = \Delta x^2 + \Delta y^2$$

$$\Delta s = \sqrt{\Delta x^2 + \Delta y^2}$$

$$\lim_{\Delta x \rightarrow 0} \sum \sqrt{\Delta x^2 + \Delta y_i^2}$$

$$\lim_{\Delta x \rightarrow 0} \sum f(x_i) \Delta x = \int_a^b f(x) dx$$

$$\lim_{\Delta x \rightarrow 0} \sum \sqrt{1 + \frac{\Delta y_i^2}{\Delta x^2}} \Delta x$$

$$\lim_{\Delta x \rightarrow 0} \sum \sqrt{1 + \frac{\Delta y_i^2}{\Delta x^2}} \Delta x$$

$$\lim_{\Delta x \rightarrow 0} \frac{\Delta y}{\Delta x} = \frac{dy}{dx}$$

arc length

$$\int_a^b \sqrt{1 + \left(\frac{dy}{dx}\right)^2} dx$$

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Ex 2  $y = \frac{4\sqrt{2}}{3} x^{3/2} - 1$   $0 \leq x \leq 1$

$$\frac{dy}{dx} = \frac{4\sqrt{2}}{3} \cdot \frac{3}{2} x^{1/2}$$

$$\frac{dy}{dx} = 2\sqrt{2} \sqrt{x}$$

$$\frac{dy}{dx} = 2\sqrt{2x}$$

let  $u = 1 + 8x$   
 $du = 8 dx$

$$\frac{1}{8} du = dx$$

$$x=0 \quad u=1$$

$$x=1 \quad u=9$$

$$\int_0^1 \sqrt{1 + (2\sqrt{2x})^2} dx$$

$$\int_0^1 \sqrt{1 + 8x} dx$$

$$\int_0^1 (1 + 8x)^{1/2} dx$$

$$\int_1^9 u^{1/2} \cdot \frac{1}{8} du$$

$$\frac{1}{8} \left( \frac{2}{3} u^{3/2} \right) \Big|_1^9$$

$$\frac{1}{8} \left( \frac{2}{3} 9^{3/2} - \frac{2}{3} 1^{3/2} \right)$$

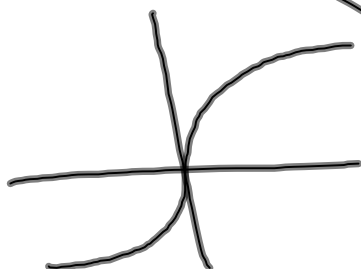
$$\frac{1}{8} \left( \frac{2}{3} (27) - \frac{2}{3} \right)$$

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Ex3

$$y = x^{\frac{1}{3}}$$

~~$$\frac{dy}{dx} = \frac{1}{3} x^{-\frac{2}{3}}$$~~



$$x's$$

$$(-8, 8)$$

$$y's$$

$$(-2, 2)$$

$$X = g(y)$$

$$\int_c^d \sqrt{1 + \left(\frac{dx}{dy}\right)^2} dy$$

$$x = y^3 \quad \frac{dx}{dy} = 3y^2$$

$$\int_{-2}^2 \sqrt{1 + 9y^4} dy$$

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